

REMARKS

As a preliminary matter, Applicant thanks the Examiner for the courtesy shown to Applicant's representative, Josh C. Snider, in the telephone interview conducted on April 17, 2006. Claims 1-6 and 19 were discussed, and mostly with respect to the Christner reference (U.S. 5,162,158), which is common to all of the outstanding rejections based on the prior art. Although agreement was not reached in the interview with respect to the patentability of the claims, Applicants thank the Examiner for his sincere effort to clarify his understanding of the present invention and the remaining issues. The amendments to the claims submitted herein, as well as the discussion below, is an attempt by Applicant to address all of the Examiner's suggestions and concerns expressed in the interview, as detailed below with respect to the specific outstanding rejections.

As a second preliminary matter, claim 2 stands objected to under 37 C.F.R. 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant appreciates the Examiner's explanation for this objection in the interview, and submits that claim 2 is not in improper dependent form. Applicant now understands that the Examiner presumes that any "metallic island" must include a "metallic compound," by definition. The Examiner can see, however, that claim 1 does not actually require that the recited metallic compound be included *as part of* the metallic islands that are also recited.

Claim 1 merely recites that the metallic compound was "among the metallic islands" (clarified herein to now read as "between the metallic islands"), and did not

affirmatively require that the metallic islands also included a metallic compound as part of the islands. Only dependent claim 2 so further limited the structure of the present invention to require that the metallic islands also included a metallic compound. Accordingly, reconsideration and withdrawal of the outstanding objection to claim 2 are respectfully requested.

Claim 19 stands rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner asserts that “the specification does not mention crystal grains contacting each other at grain boundaries.” Accordingly, Applicant has amended claim 19 to better clarify the recited features of the claim according to the description appearing in the Specification. As the Examiner can see from the amended language, claim 19 now more clearly recites that the crystal grains contact with each other at a grain boundary along which non-magnetic material diffuses. Applicant submits that support for this clarified structure can be found from page 12, line 31 to page 13, line 2 of the present Specification, which describes the grain boundaries 31 between the adjacent crystal grains 29 within the magnetic crystal layer 30. Reconsideration and withdrawal of the outstanding Section 112 rejection of claim 19 are respectfully requested in light of these amendments.

New claim 20 has been added to depend from amended claim 19, and to further define the claimed structure as having a wall of non-magnetic material formed at the grain boundary. Support for new claim 20 can be found at least at page 13, lines 2-3 of the present

Specification. Entry, consideration on the merits, and allowance of new claim 20 are also respectfully requested.

Claims 1 and 2 stand rejected under 35 U.S.C. 102(b) as being anticipated by Christner. Claim 1 has been amended herein along the lines suggested by the Examiner in the telephone interview, and Applicant therefore respectfully traverses this rejection at least in light of these amendments, which better emphasize the arguments previously made traversing this rejection.

Specifically, independent claim 1 has been amended to better emphasize the distinction in the present invention between the seed crystal layer and the magnetic crystal layer that forms above the seed crystal layer. As also explained above, claim 1 has been further amended to clarify that a metallic compound is exposed between the metallic islands, but is not necessarily part of the metallic islands themselves according to this language in independent claim 1. A metallic compound is a part of the metallic islands according to the limitations in claim 2. The Examiner should find that these amendments sufficiently clarify the present invention to warrant withdrawal of the outstanding rejections based on the Christner reference, in whole or in part.

As discussed in the telephone interview, the Examiner considers the prior art to teach away from the desirability of forming material between the crystal grains, and also away from having the grains contact each other. Claim 1 thus now more clearly defines that material is formed between the metallic islands, which are the core upon which the crystal grains grow. As now more clearly featured in independent claim 1, the seed crystal layer

contains crystal grains, and each of the crystal grains has grown from a corresponding one of the metallic islands so as to stand from a surface of the metallic compound that is also exposed between the metallic islands. Claim 1 also now features that the magnetic crystal layer contains magnetic crystal grains, which magnetic crystal grains have grown from a corresponding one of the crystal grains of the seed crystal layer. The Examiner should find that Christner cannot read upon this structure.

Support for these clarifying amendments can be found in Figs. 2 and 10-11 of the present Application, and their accompanying descriptions. These drawings illustrate the seed crystal layer 28, and the magnetic crystal layer 30. Figs. 3-5 of the present Application further illustrates how Co atoms 31, Pt atoms 32, and SiO₂ molecules 33 are sputtered to fall on the surface of the substrate 21, and how nucleation sites 27 are thus formed. The deposited SiO₂ molecules serve to separate the fine metallic nucleation sites 27 from one another, as best seen in Figs. 4-5 and 10-11.

This separation between the nucleation sites 27 is significant, as explained on page 12 of the present Specification. The separate between the nucleation sites allows the Cr atoms to fall directly on the substrate 21 after the nucleation sites have been completely formed. Cr will therefore form not only on the nucleation sites themselves, but also on the surface of the substrate 21 between the nucleation sites. (See page 10, lines 9 to 12). The Cr atoms may then also form the fine crystal grains that make up the seed crystal layer 28 (page 12, lines 13-15), which seed crystal layer is also described to be “on the substrate 21.” (page 12, lines 15-16).

The differences between the present invention and Christner (as well as the other prior art) should thus become clear from this description in the present Specification, and the accompanying illustrations. A nucleation site is not the same as a crystal grain, but is in fact the core from which the crystal grain is formed. When Cr atoms fall on the surface of the substrate, individual Cr atoms can have a large enough energy to induce a so-called “migration” of Cr atoms toward the nucleation sites. Cr atoms thus aggregated around a nucleation site will also form the associated crystal grain above the site.

As previously discussed, and recognized by the Examiner, Christner describes that the grains 36, 38, 40, and 42 are deposited *only on the top surfaces of the grains 43* of the chromium layer 20. (See Fig. 3 of Christner). In other words, Christner specifically teaches that its grains do not stand on the surface of Christner’s substrate 16, and therefore Christner cannot read upon the present invention, as explained above. The clarifications to independent claim 1 made herein should make these distinctions over the Christner reference that much more apparent. Accordingly, Applicant submits that the Section 102 rejection of claims 1 and 2 based on Christner has been fully overcome.

Claims 1-6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the same Christner reference, but in combination with one of Ranjan et al. (U.S. 5,162,158; claims 1-4 only), Chen et al. (U.S. 5,162,158; claims 1-2 only), and Bertero et al. (U.S. 6,150,015; all of claims 1-6). Applicant therefore traverses all of these rejections for reasons similar to those discussed above with respect to the Christner reference alone. Christner by itself cannot read upon the present invention, and even teaches away from the structure that

deposits a metallic compound between the nucleation sites. None of Ranjan, Chen, and Bertero explain, or make up for, these deficiencies in the Christner reference.

As previously discussed, both Ranjan and Bertero fail to make any distinction between a metallic crystal layer, and crystal grains that may be contained within such a layer.

As recited in independent claim 1 of the present invention, more than just a simple magnetic crystal layer is formed above the nucleation sites on the substrate. In fact, claim 1 clearly features that the seed crystal layer contains crystal grains, each of which has grown from a corresponding metallic island, and the magnetic crystal layer contains magnetic crystal grains, each of which has grown from a corresponding crystal grain in the seed crystal layer.

Chen, on the other hand, does not even disclose a separation to islands formed on a substrate.

None of the cited prior art references therefore, alone or together, teach or suggest the structure of the present invention. Accordingly, at least according to the requirements of Section 2143.03 of the MPEP, the outstanding Section 103 rejections should be withdrawn.

The outstanding obviousness rejections should also be withdrawn because, even if proper *prima facie* case of obviousness could be established, such a case would be fully rebutted by the clear advantages realized by the present invention over the prior art. A purpose of the present invention is to establish fine crystal grains in a polycrystalline structure film based on the metallic nucleation sites formed. When such a polycrystalline structure film is utilized in a magnetic recording medium, for example, transition of noise can be suppressed to a significant degree between adjacent recording tracks. These recording tracks can thus be arranged at a much higher density over the magnetic recording medium

than can be realized by any of the cited prior art references, alone or together. The recording capacity of a magnetic recording medium according to the present invention therefore, is significantly improved over the prior art.

It is known in the art that a single magnetization is established in a magnetic domain for each crystal grain. When the size of crystal grains is large with respect to the distance between adjacent tracks in the recording medium, such large crystal grains can more easily overlap the boundary between these adjacent tracks. When such large crystal grains overlap the boundary, a problem can occur that opposing magnetization can be experienced across the boundary, which is undesirable.

It is more desirable that the magnetization be consistent on either side of the boundary between adjacent tracks, and this goal is better accomplished by the present invention, which is more able than the prior art to reduce the size of crystal grains on the magnetic recording medium. With such smaller crystal grain size, the possibility of magnetic domains overlapping the boundary between adjacent tracks is reduced, and therefore the distance between adjacent tracks can also be reduced, thereby allowing for a significant increase in recording density on the medium. These advantages can all be better accomplished according to the recited structure of the present invention, which yields significantly finer crystal grains on a substrate than the cited prior art references could realize. Accordingly, Applicant submits that any of the stated obviousness rejections would be also overcome on rebuttal for at least these additional reasons.

For all of the foregoing reasons, Applicant submits that this Application, including claims 1-6 and 19-20, is in condition for allowance, which is respectfully requested. The Examiner is invited to again contact the undersigned attorney if a further interview would expedite prosecution, or if the Examiner would like further clarification of any of the matters discussed herein.

Respectfully submitted,

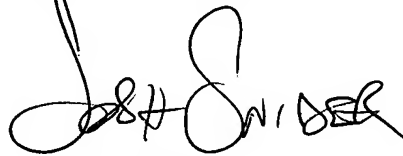
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By

A handwritten signature in black ink, appearing to read "Josh C. Snider". The signature is stylized with a large initial "J" and "S".

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